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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/810,792

Applicant(s)

SUGIMOTO ET AL.

Examiner

ANNER HOLDER

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09/08/08.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 02/24/09 have been fully considered but they are not persuasive. As to Applicant's arguments, Examiner respectfully disagrees. It is well known and recognized in the art that a filter operates to interpolate values as well as motion compensation. [As understood by the Examiner interpolation is the estimation of a value using known information as evidenced in Joch - col. 5 lines 39-67; col. 6 lines 1-7; col. 12 lines 4-35; col. 11 lines 25-29] Joch fairly suggests and teaches the limitations as claimed. The motion (complexity information) is considered in the temporal and spatial compensation (filtering process) see Joch - figure 4.
2. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "the interpolation, such as 'by disposing interpolated pixels at the 1/2 pixel positions or 1/4 pixel positions between the integer pixels of the reference frame'.") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 14, 16-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation is not supported by the original disclosure "none of the original pixels are filtered".

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 2, 6-8, 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Murakami et al. (Murakami) US 6,272,177 B1 in view of Joch et al. (Joch) US 7,227,901 B2 further in view of Karczewicz et al. US 6,950,469 B2.

7. As to claim 1, Murakami teaches a video encoding apparatus comprising motion compensation prediction means for dividing a coding target frame into a plurality of blocks, [Col. 1 Lines 45-46 and 66-67] generating a prediction reference image that are formed by providing intra-block interpolated pixels which are produced by interpolation between integer pixels of a reference pixel in a predetermined region of the reference frame, [Col. 1 Lines 45-46; Col. 2 Lines 4-7; Fig. 1; Figs. 6-8; Fig. 13-17] and generating a predicted image the coding target frame by determining a motion vector for the

prediction reference images for each of the plurality of blocks, [Colo. 1 Lines 40-46; Fig. 1; Figs. 6-8; Fig. 13-17] the motion compensation prediction means having: complexity extraction means for extracting complexity information which indicates a degree of complexity of movement between said coding target frame and said reference frame for each of the plurality of blocks using inter-block analysis; [Col. 1 Lines 40-43; Col. 9 Lines 14-23; Col. 3 Line 65 - Col. 4 Line 5; Col. 8 Line 66 – Col. 9 Line 8; Col. 9 Lines 12-39; Col. 12 Lines 17-26; Col. 13 Lines 50-54; Fig. 1; Figs. 6-8; Fig. 13-17; the prediction error is clearly a measure for the motion complexity.] Murakami also teaches the use of low-pass filters. [Fig. 9; Col. 12 Lines 27-35]

Murakami does not specifically teach filter storing means for preliminarily storing two low-pass filters with different high-frequency cutoff characteristics; and predicted image generating means for determining the number of filtering pixels depending on said complexity information for each of the plurality of blocks on basis of a predetermined rule, wherein said filtering pixel is said interpolated pixel which have pixel values produced by applying the low-pass filter having the narrower spectral band-pass in low frequency band of said two low-pass filters to neighborhood integer pixels.

Joch teaches filter storing means for preliminarily storing [Fig. 4 (44)] two low-pass filters with different high-frequency cutoff characteristics; [Fig. 4 (spatial compensation process); fig. 5] and predicted image generating means [Fig. 4 (spatial compensation process)] for determining the number of filtering pixels depending on said complexity information for each of the plurality of blocks on basis of a predetermined rule, [Fig. 4;] wherein said filtering pixel is said intra-block interpolated pixel which have

pixel values produced by applying the low-pass filter having the narrower spectral band-pass in low frequency band of said two low-pass filters to neighborhood integer pixels. [Fig. 3a (47 – p or q); Figs. 3b -4; Fig. 5 (130 or 134); col. 5 lines 58-6Col. 17 lines 58-67; Col. 19 lines 2-7]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Joch with the coding device of Murakami, to allow for efficient filtering and reduction of artifacts.

Murakami modified by Joch does not explicitly teach sub-pixel interpolation.

Karczewicz teaches sub-pixel interpolation. [fig. 5; figs. 15-18; fig. 21; col. 6 lines 49-57; col. 7 lines 4-23; col. 36 line 54 - col. 37 line 3; col. 40 line 50 - col. 41 line 23; col. 43 lines 1-26, 53-64]

It would have been obvious to one of ordinary skill in the art at the time the invention made to integrate the teachings of Karczewicz with the device of Murakami modified by Joch allowing for improving image quality.

8. As to claim 2, see rejection of claim 1, except this is a claim to an encoding method with the same limitations as claim 1.
9. As to claim 6, see rejection of claim 1, except this is a claim to an encoding program with the same limitations as claim 1.
10. As to claim 7, see rejection of claim 1, except this is a claim to a decoding apparatus with the same limitations as claim 1. Decoding apparatus performs the inverse function of the encoding apparatus having the same units as the local decoder (5) in Fig. 1 and performing the same tasks of a remote decoder.

11. As to claim 8, see rejection of claim 1, except this is a claim to a decoding method with the same limitations as claim 1.

12. As to claim 12, see rejection of claim 1, except this is a claim to a decoding program with the same limitations as claim 1.

13. As to claim 13, Murakami modified by Joch teach the interpolated pixels comprise the filtering pixels; [Joch - fig. 4; fig. 3a; fig. 5; col. 10 lines 6-20, 28-46, 54-67; col. 12 lines 4-35] and wherein the number of interpolated pixels that are filtered is determined based on the complexity information. [Joch - fig. 3a; fig. 4; fig. 5; col. 13 lines 20-50]

14. As to claim 14, Murakami modified by Joch and Karczewicz teaches the integer pixels comprises original pixels; [Joch - fig. 3a; fig. 4; fig. 5; col. 13 lines 20-50] wherein the predicted image comprises original pixels and interpolated pixels; [Joch – fig. 5; fig. 3a; col. 13 lines 20-50; not all pixels of the macroblock are filtered only those on the boundary] and wherein none of the original pixels are filtered. [Joch – fig. 5; fig. 3a; col. 13 lines 20-50; not all pixels of the macroblock are filtered only those on the boundary]

Joch discloses that a portion of the original pixels are filtered. All of the component elements and methods are disclosed by Joch. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device as claimed, since one of ordinary skill in the art would be reasonable expected to try all of the techniques at his/her disposal. *KSR v. Teleflex*, 550 U.S. 127 S. Ct. 1727, 82 U.S.P.Q.2d 1385 (2007)

15. As to claim 15, see the discussion of claim 13 above.

16. As to claim 16, see the discussion of claim 14 above.
17. As to claim 17, Murakami modified by Joch and Karczewicz teaches interpolated pixels comprise the filtering pixels; [Joch - fig. 4; fig. 3a; fig. 5; col. 10 lines 6-20, 28-46, 54-67; col. 12 lines 4-35] wherein the number of interpolated pixels that are filtered is determined based on the complexity information; wherein the integer pixels comprises original pixels; [Joch - fig. 3a; fig. 4; fig. 5; col. 13 lines 20-50] wherein the predicted image comprises original pixels and interpolated pixels; [Joch - fig. 5; fig. 3a; col. 13 lines 20-50; not all pixels of the macroblock are filtered only those on the boundary] and wherein none of the original pixels are filtered. [Joch - fig. 5; fig. 3a; col. 13 lines 20-50; not all pixels of the macroblock are filtered only those on the boundary]
18. As to claim 18, see discussion of claim 17 above.
19. As to claim 19, see discussion of claim 17 above.
20. As to claim 20, see discussion of claim 17 above.
21. Claims 3, 5, 9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al. (Murakami) US 6,272,177 B1 in view of Joch et al. (Joch) US 7,227,901 B2 in view of Karczewicz et al. US 6,950,469 B2 further in view of Sun et al. (Sun) US 2002/0146072 A1.
22. As to claim 3, Murakami (modified by Joch and Karczewicz) teaches the inter-block analysis of the complexity extraction means uses an absolute value of a differential motion vector. [Col. 1 Lines 39-49]

Murakami (modified by Joch and Karczewicz) does not explicitly teach the use of a block neighboring the block for which the complexity information is to be extracted as the complexity information.

Sun teach the use of a block neighboring the block for which the complexity information is to be extracted as the complexity information. [Pg. 4 ¶0050-0051]

It would have been obvious at the time the invention was made to combine Sun's teaching of using adjacent block information with the coding device of Murakami (modified by Joch and Karczewicz), to optimize image processing by utilizing the similar coding parameters of the adjacent blocks and skipping unnecessary redundant functions.

23. As to claim 5, see rejection of claim 3 above.

24. As to claim 9, see rejection of claim 3, except this is a claim to decoding method with the same limitations as claim 3.

25. As to claim 11, see rejection of claim 3, except this is a claim to decoding method with the same limitations as claim 3.

26. Claims 4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al. (Murakami) US 6,272,177 B1 in view of Joch et al. (Joch) US 7,227,901 B2 in view of Karczewicz et al. US 6,950,469 B2 further in view of Shen et al. (Shen), "Adaptive Motion Vector Resampling for Compressed Video Down Scaling", IEEE, 1997.

27. As to claim 4, Murakami (modified by Joch and Karczewicz) teaches limitations of claim 2.

Murakami (modified by Joch and Karczewicz) does not specifically teach conversion step in which conversion means converts predicted residual difference image produced by calculating a difference between the coding target frame and the predicted image into a set of coefficients on the basis of a predetermined conversion rule, wherein the complexity extraction means use the numbers of non-zero coefficients among the coefficients in a block neighboring the blocks for which the complexity information is to be extracted as the complexity information.

Shen teaches conversion step in which conversion means converts predicted residual difference image produced by calculating a difference between the coding target frame and the predicted image into a set of coefficients on the basis of a predetermined conversion rule, wherein the complexity extraction means use the numbers of non-zero coefficients among the coefficients in a block surrounding the blocks for which the complexity information is to be extracted as the complexity information. [Pg 772 Col. 2 ¶ 2 lines 8-9 (number of non-zero DCT coefficients of prediction residuals as a measure of block activity – well known strong spatial correlation of image data.)]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the use of non-zero coefficients for prediction teachings of Shen with the coding device of Murakami (modified by Joch and

Karczewicz), allowing for more accurate prediction of the motion vector, the quantities are proportional to the spatial activity measurement. [Pg 772 Col. 2 ¶ 2]

28. As to claim 10, Murakami (modified by Joch and Karczewicz) teaches limitations of claim 8.

Murakami (modified by Joch and Karczewicz) does not specifically teach conversion step in which conversion means converts predicted residual difference image produced by calculating a difference between the coding target frame and the predicted image into a set of coefficients on the basis of a predetermined conversion rule, wherein the complexity extraction means use the numbers of non-zero coefficients among the coefficients in a block neighboring the blocks for which the complexity information is to be extracted as the complexity information.

Shen teaches conversion step in which conversion means converts predicted residual difference image produced by calculating a difference between the coding target frame and the predicted image into a set of coefficients on the basis of a predetermined conversion rule, wherein the complexity extraction means use the numbers of non-zero coefficients among the coefficients in a block neighboring the blocks for which the complexity information is to be extracted as the complexity information. [Pg 772 Col. 2 ¶ 2 lines 8-9 (number of non-zero DCT coefficients of prediction residuals as a measure of block activity – well known strong spatial correlation of image data.)]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the use of non-zero coefficients for prediction

teachings of Shen with the coding device of Murakami (modified by Joch and Karczewicz), allowing for more accurate prediction of the motion vector, the quantities are proportional to the spatial activity measurement. [Pg 772 Col. 2 ¶ 2]

Conclusion

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wilson US 5,754,250.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANNER HOLDER whose telephone number is (571)270-1549. The examiner can normally be reached on M-Th, M-F 8 am - 3 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on 571-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Anner Holder/
Examiner, Art Unit 2621

/Tung Vo/
Primary Examiner, Art Unit 2621